

Financing Projects That Use Clean Energy Technologies: An Overview of Opportunities and Barriers

Daniel P. Goldman — Chief Financial Officer, New Energy Capital Corp.

John J. McKenna — Managing Director, Hamilton Clark & Co.

Lawrence M. Murphy — Manager, Enterprise Development Program, National Renewable Energy Laboratory

Defining Project Financing

Project financing is asset-based financing, meaning that the project lenders have recourse only to the underlying assets of the project. It typically involves both debt and equity, where the debt-to-equity ratio is a large component of the total upfront capital requirements (e.g., 70% debt to 30% equity). Debt is used when available and when it is the least expensive form of financing (Figure 1) with equity still needed for creditworthiness. Most importantly, earnings from the project before interest, depreciation, and taxes must be able to generate a return to the equity investors, and pay for interest and principal on the debt, transaction costs associated with developing and structuring the project, and operations and maintenance costs. Such payments are typically structured in a “waterfall,” where operations and maintenance costs have highest priority, then debt repayment, then return to equity investors.

Successful project financing must provide a structure to manage and share risks in an optimal way that benefits all participants by allocating risks to those entities that are best able to manage them. Contractual agreements are the principal means of mitigating project-related risks (Figure 2). Today’s project financing typically involves the creation of a stand-alone project company that is the legal owner of the project assets, and that has contractual agreements with other parties, such as purchasers of the products, suppliers, lenders, investors, regulatory entities, sponsors, operators, insurers, and firms that engineer, procure and construct the project. Traditionally, project financing has been focused on large-scale projects—typically greater than \$500 million. In contrast, clean-energy projects are typically much smaller, whose size does not allow them to easily absorb the high administrative and transaction costs typical of non-recourse financing.

Example clean-energy projects include an ethanol plant using new biomass conversion technology, a manufacturing facility for a new photovoltaic technology, an apartment building that is installing water-metering equipment, and a large landfill that wants to deploy Stirling engines to generate electricity from methane.

Leverage when Debt Interest is Lower than the Return on an All Equity Investment		
Project Cost, \$K	10,000	
Annual Net Revenue, \$K	1468	
Debt Interest Rate, %	6	
Term, Yrs	12	
<i>Simple example with no tax or salvage effects considered</i>	All Equity	Debt & Equity
Debt / Equity	0/100	70/30
Debt, \$K	0	7000
Equity, \$K	10000	3000
Debt Payment to Lender, \$K	0	835
Cash Flow to Equity Holder, \$K	1468	633
IRR from Cash Flow, %	10	18
Figure 1. A simple example: Cash flow gives a 10% IRR for the all equity investment, and 18% IRR for the 30% / 70% debt (@ a 6% loan interest) investment. Note that the sum of payments to debt and equity investors equals project revenues.		

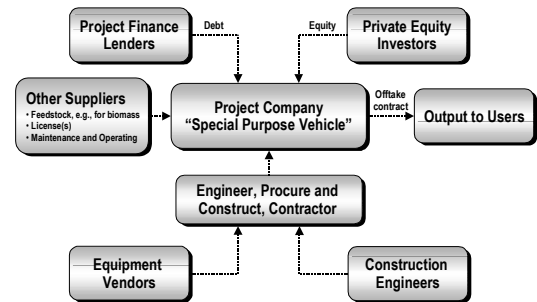
The Importance of Project Financing for Clean Energy Technology Deployment

Typically, neither the manufacturer nor the purchaser can self-finance, nor are they able to secure financing using their non-project assets. So, project financing is often the only way that energy-technology companies can move their products from early adopter customers to mainstream customers. Project financing represents a crucial enabler on the critical path to large scale deployment of these technologies. Thus, the ability to attract an affordable

combination of debt, equity, and other sources of funding for the project is key to commercial success.

Other financial players also have a stake in the ultimate availability of project financing. For instance, the public sector has invested substantial capital in R&D for these technologies, and its goals depend on their eventual commercialization. Further, while there clearly is a gap between venture capital and project financing, venture capitalists want to see a clear path to commercialization even in their early venture investments. Project financing availability also enables follow-on venture investment to occur at higher valuations.¹

Figure 2. Example Project Structure Showing Numerous Contractual Relationships



Key Challenges Involved in Financing Clean Energy Technology Projects

Clean energy projects present risks in terms of technology, creditworthiness, revenue security, and market competition risk, each of which is discussed below. In addition, other issues within the larger context of today's project financing industry adds to these challenges. For example in the utility arena, even where projects use proven conventional technologies, the recent over-supply of electric capacity from merchant power plants have made project financing in the deregulated electric market difficult to obtain; especially the debt portion. Also, restructuring in the utility industry has resulted in other difficulties; e.g., the creditworthiness of unregulated utility affiliates that agree to purchase the power from projects cannot always be assumed to be strong, *a-priori*, and in cases where transmission and generation resources have been de-bundled, access to the transmission cannot always be assured.

Further, it should be noted that each clean-energy technology will have a different risk profile. For example, wind projects using well established wind turbines may have virtually no technical risk (though they have a resource-availability risk) But a pioneering biomass-to-ethanol plant may have significant perceived technical risk (though little or no resource-availability risk).

Technology Risk: Project investors worry foremost about technology risk. This worry must be effectively addressed as a prerequisite to any dialogue with lenders and equity investors, or they will not provide financing. Project financing lenders will not accept the risk that the technology will be unable to perform consistently in a commercial setting to commercial standards over the life of the loan. Nor will they accept the risk that a technology will become prematurely obsolete—a concern that arises when a project involves a state-of-the-art technology in an industry in which technology is rapidly evolving.

A key challenge with many clean-energy technologies is that there is often no information on which to make comparisons, or no experience base or track record in the marketplace, which is needed for due diligence and risk assessment by the project financiers. Technology risk is a particularly thorny issue with plants employing new technology (e.g., some wind farms using newer turbine designs) manufactured by an early-stage company, that carry high costs, and that have unproven performance in a commercial setting.

¹ Venture capitalists do not typically invest directly in project opportunities. The time frame to maturity is often too long, upside limited and risk profile more managed without a clear exit strategy.

It should also be recognized that investors along the technology-maturation spectrum often interpret technology risk differently. A public-sector sponsor of high-risk R&D will tend to see less risk than a venture capitalist, than will a project financier who wants to see well documented, technical verification and acceptance in the marketplace. Often the most overly optimistic view is that held by the entrepreneur that has progressed through a working-bench model, an alpha test, and a pilot-scale site that seems to be working, and who feels that commercialization is close at hand. These views must be reconciled for successful financing to take place. Ultimately, the reconciliation requires expenditure of capital to verify, through independent engineers, marketing consultants, or other independent third parties, that a technology will perform to plan and that the risk of obsolescence or displacement in the market is manageable.

Creditworthiness Risk: The amount of debt the project can raise is a function of the project's expected capacity to service debt from project cash flow—or, more simply, its credit strength. Typically, a project has no operating history at the time of its initial debt financing. In general, a project's credit strength derives from: (1) the inherent value of the assets included in the project; (2) the expected profitability of the project; (3) the amount of equity that project sponsors have at risk (after the debt financing is completed); and, indirectly, (4) the pledges of creditworthy third parties or sponsors involved in the project.

With many projects based on clean-energy technology, especially with relatively new technology, creditworthiness is a concern to lenders. Often the relatively new, clean-energy technology not only lacks sufficient testing and verification, it also lacks sufficient acceptance in the marketplace. Plus, the technology is frequently manufactured by an early-stage company that may have a weak balance sheet and no credit track record. This credit issue is compounded when the start-up company manufactures the technology and acts as the project owner (in such cases the project is de facto the company and its viability depends on project success).

Creditworthiness for clean-energy projects can be enhanced by integrating, and monetizing all appropriate tax benefits and incentives in the project financing plans, minimizing credit risks as much as possible. Other suggestions for reducing and sharing risk and therefore as a way of enhancing creditworthiness include: the use of insurance from non-traditional sources; subordinated debt; and fall-away loan guarantees that disappear when the project meets the test of technology commercialization or when the market risk has been mitigated by a minimum throughput or minimum sales; and loan guarantees from third parties (and maybe even from venture-capital investors). Again, appropriate project structuring is key.

Revenue Security Risk: According to the Massachusetts Renewable Energy Trust, another formidable risk is the need for revenue security over the time required to pay back the capital investment. To address this issue, the Trust has implemented “put” and “put back” options for clean-energy projects. Also, because renewables tend to be so capital intensive, most of the costs must be amortized over a long period of time if debt is to become available. Fifteen years, for example, is a common requirement in New England.

Moreover, recent innovations in finance, including currency futures, other options, interest rate swaps and caps, and currency swaps, have provided project sponsors with new vehicles for managing certain types of project-related risks more cost-effectively while securing revenue.

Market Competition Risk: It is important for project and other financiers to know the hurdles that energy-technology entrepreneurs are dealing with in the market. They also need to stay current on state of the technology, to know what customers and consultants are actually saying about markets, and to think creatively about how to accept later-stage technology risks. For

instance, clean- and renewable-energy technology projects often have higher capital costs than projects utilizing traditional power-generation technologies, but may have substantially lower (or no) fuel costs during operations. Further, if the renewable resource is limited (e.g., for a solar plant that can only operate when the sun shines) then cash flows, and margins will be lower compared to fossil plants and thus put further pressure on overhead and maintenance costs. This can make them more difficult to finance to the extent that their revenues are limited by the price of electricity (this price is based on the cost of producing power using the marginal source of supply, unless government intervenes through such mechanisms as renewable portfolio standards).

Funding sources sometimes see this as indicating that the technology will become outdated, thus posing a risk that the project in question will have difficulty performing and generating sufficient revenues for the term of the financing. On the other hand, especially if the technology does not utilize a feedstock that must be purchased, the full life-cycle costs of the project may be competitive or superior to a traditional alternative whose revenues are sensitive to feedstock costs. Over time, the capital costs of these projects will become more competitive as costs of manufacturing drop due to increased production or a decrease in per-unit cost. Moreover, the cost of project development (including transaction costs of securing financing) will drop through learning and standardization.

Scale and Related Cost Issues: With the small size of many renewable energy projects, due diligence and transaction costs can make the cost of project financing prohibitive. These costs will drop over time as lenders become more familiar with clean-energy projects. They will also drop with the development of standardized documentation for project financing, after the initial expense of first developing the documentation. Plus, in some cases it may also be possible to lower costs by bundling projects with dissimilar risk characteristic into a portfolio, in which the portfolio of projects would present a lower risk than any single project.

Some Final Thoughts for Enhancing Project Financing Availability

Entrepreneurs must understand the most strenuous tests that investors will put them through before writing checks. They won't get money from any investor—whether public or private—if they don't meet the investor's needs. Hence, understanding the needs of financiers is a required first step in developing a more effective working relationship among entrepreneurs, lenders and investors—especially with respect to risks such as those related to technology and markets.

Financiers can also benefit, and thereby help increase the yield on their investments and loan portfolios, if they develop a better understanding of early-stage energy technologies and their inherent risk profiles, and if they integrate this understanding into their project lending and investment criteria early on. They can accomplish this by (1) involving themselves in the planning stage of energy technology projects prior to the time that the company is seeking financing; (2) seeking to better understand the underlying technology risk and the specific issues for a given project, instead of assuming that all new-technology projects are inherently risky; (3) organizing a briefing for their credit committees and commitment committees, which would cover issues specific to advanced and renewable-energy projects; (4) actively participating in energy technology venues such as the NREL Industry Growth Forums; and (5) closely coordinating venture-level investments within their organizations with project-level investments.

Finally, based on the discussion above, we emphasize the need to develop a place in the company's capital structure between venture-capital financing and (traditional) project financing. This clearly points to the need for a financing bridge between working models of the technology and commercial products and the associated project financing.

